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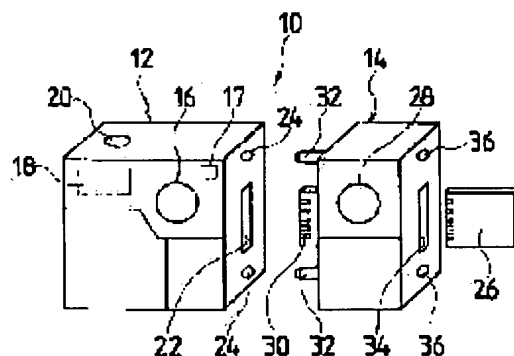
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(54) PHOTOGRAPHING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a photographing device capable of photographing even stereoscopic images and the panoramic images of high image quality as needed while keeping portability equivalent to or better than a conventional camera in the case of being used as a single lens camera for obtaining normal two-dimensional images.

SOLUTION: For a first photographing unit capable of functioning as this photographing device by a single body, a second photographing unit provided with a photographing optical system is provided freely attachably and detachably by a joint 32 and a connector 30. Further, the second photographing unit 14 is constituted so as to be capable of successively and extendibly connecting a different unit provided with a similar connection structure and the slot 22 of an external storage device 26 is utilized for the delivery means of information between the respective units. Also, a means for adjusting the position of the photographing image of the second and succeeding photographing units to the photographing image by the first photographing unit 12 is provided, the other unit is driven in synchronism with the release signals of the first photographing unit 12 and simultaneous photographing and consecutive photographing are performed.



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CLAIMS

[Claim(s)]

[Claim 1] Photography equipment characterized by preparing directly the 2nd photography unit which has the 2nd photography optical system removable to the 1st photography unit which has the 1st photography optical system.

[Claim 2] Said 2nd photography unit is photography equipment according to claim 1 characterized by being constituted so that it may have directly removable structure for the 3rd photography unit which has the 3rd photography optical system further and the sequential connection of two or more photography units can be carried out.

[Claim 3] Photography equipment according to claim 1 or 2 characterized by having a connection detection means to detect that the photography unit of said 2nd henceforth was connected to said 1st photography unit, a signal transduction means to deliver information among two or more photography units, and the control means that synchronizes or interlocks photography actuation of two or more photography units.

[Claim 4] an optical axial angle degree adjustable means by which the include angle of the optical axis of the 2nd [to the optical axis of a lens spacing adjustable means by which the distance between said 1st and 2nd photography optical system can be adjusted, and said 1st photography optical system / said] photography optical system can be adjusted, and ** -- the photography equipment according to claim 1, 2, or 3 characterized by having one [at least] means inside.

[Claim 5] claims 1-4 characterized by each photography unit having the power source independently, respectively -- photography equipment given in any or the claim of 1.

[Claim 6] claims 1-4 characterized by establishing a current supply means to supply power to other photography units from the power source of said 1st photography unit -- photography equipment given in any or the claim of 1.

[Claim 7] claims 1-6 characterized by for each photography unit having an image pick-up means to change the light from a photographic subject into an electrical signal, respectively, and acquiring a photography image as an electronic image -- photography equipment given in any or the claim of 1.

[Claim 8] Photography equipment according to claim 7 characterized by establishing a means to adjust the location of the photography image by the 2nd [to the photography image by the 1st photography unit] photography unit.

[Claim 9] Photography equipment according to claim 7 characterized by having the adjustment device which adjusts the image logging location of the 2nd photography optical system, and/or an include angle while overlapping the image photoed according to the 1st photography optical system, and the image photoed according to the 2nd photography optical system and making it display on an image display means.

[Claim 10] Photography equipment according to claim 9 characterized by having a storage means to save the amount of adjustments adjusted with said adjustment device.

[Claim 11] Photography equipment according to claim 7 characterized by having the adjustment device which adjusts the sense of the lens optical axis of the 2nd photography optical system, overlapping the image photoed according to the 1st photography optical system, and the image photoed by the 2nd photography optical system, and making it display on an image display

means.

[Claim 12] claims 1-11 characterized by other photography units performing the 1st photography unit, simultaneously image incorporation synchronizing with the photography start signal of the 1st photography unit -- photography equipment given in any or the claim of 1.

[Claim 13] claims 1-11 characterized by performing continuous shooting by two or more photography units by shifting the image incorporation timing of each photography unit predetermined time on the basis of the image incorporation timing of the 1st photography unit -- photography equipment given in any or the claim of 1.

[Claim 14] AE detection means for the 1st photography unit to detect AE value for automatic exposure control, The AWB detection means for detecting the AWB value for automatic white balance control, And it has at least one means among AF detection means for detecting AF value for automatic-focusing control. this -- AE value, AWB value, or AF value acquired in the 1st photography unit -- being based -- the automatic exposure control of other photography units -- claims 1-13 characterized by performing at least one control among automatic white balance control and automatic-focusing control -- photography equipment given in any or the claim of 1.

[Claim 15] AE detection means for the 2nd photography unit to detect AE value for automatic exposure control, It has at least one means among AF detection means for detecting the AWB detection means for detecting the AWB value for automatic white balance control, and AF value for automatic-focusing control. In the 1st and 2nd photography units Photography equipment according to claim 14 characterized by sharing detection of AE value, an AWB value, and AF value, and using a detection result mutually.

[Claim 16] Photography equipment given in any 1 claim of claims 1-15 characterized by having the lens control means which drives the lens of each photography unit so that a zoom lens may be adopted as the photography optical system of each photography unit, respectively and the zoom scale factor of each photography optical system may agree.

[Claim 17] claims 7-16 characterized by preparing the gain adjustment device which adjusts the gain of a video signal to the 2nd photography unit, and doubling the video signal of the 2nd photography unit with the video-signal level of the 1st photography unit -- photography equipment given in any or the claim of 1.

[Claim 18] An image display means by which are a means to display an image and the parallax barrier display layer for displaying the parallax barrier which consists of the pattern with which the light transmission section and the optical electric shielding section were located in a line with the upper layer of the screen by turns was prepared, It is made to correspond to the pitch of the parallax barrier discovered in said parallax barrier display layer. The signal-processing means on which the image pattern which arranged the strip-of-paper-like image fragment in which the strip-of-paper-like image fragment equivalent to the image for left eyes and the image for right eyes is arranged by turns, or two or more images are shown to the circuit system is displayed, claims 7-17 characterized by enabling a preparation, stereoscopic vision, or a picture change display -- photography equipment given in any or the claim of 1.

[Claim 19] claims 7-17 characterized by photoing the image of a focus location which is different with two or more photography units, compounding the focus field of each image, and obtaining the image which the focus suited on the whole screen -- photography equipment given in any or the claim of 1.

[Claim 20] claims 7-17 characterized by extracting the depth distribution information in a screen from the image obtained in two or more photography units, and adding special effect processings, such as BOKASHI, to parts other than a specific distance -- photography equipment given in any or the claim of 1.

[Claim 21] claims 7-20 characterized by having the means which changes automatically the display of the shot number of sheets which can be photoed according to the number of the connected photography units -- photography equipment given in any or the claim of 1.

[Claim 22] claims 7-21 characterized by establishing the file management means which carries out automatic grant of the file name of a distinguishable different format easily with the file name of the image file on which independent image data is recorded to this image file while recording a

series of image data acquired that it is simultaneous or continuously in two or more photography units into one image file -- photography equipment given in any or the claim of 1.

[Claim 23] claims 7-21 characterized by establishing the file management means which carries out automatic grant of the file name which shows relevance, respectively to each of that image file while recording a series of image data acquired that it is simultaneous or continuously in two or more photography units as an image file according to individual, respectively -- photography equipment given in any or the claim of 1.

[Claim 24] Photography equipment according to claim 1 to 23 characterized by constituting so that the non-contact means of communications using the electromagnetic wave which contains light in at least two photography units may be prepared and an electromagnetic wave can perform signal transduction between photography units.

[Claim 25] The electronic camera characterized by forming the connection section which is the electronic camera used as 1st photography unit according to claim 1, and by which said 2nd photography unit is connected with the side face of a body, the information transmission-and-reception section which delivers data between the 2nd photography unit connected through this connection section, and **.

[Claim 26] Said information transmission-and-reception section is an electronic camera according to claim 25 characterized by making the slot for external storage by which external storage is detached and attached serve a double purpose.

[Claim 27] The photography unit characterized by having the engagement means which can engage with the image pick-up section which consists of a configuration equivalent to the photography optical system carried in said electronic camera, and the connection section of said electronic camera, and the 2nd information transmission-and-reception section connectable with said information transmission-and-reception section including an image pick-up means to be a photography unit removable to an electronic camera according to claim 25, and to change the light from a photographic subject into an electrical signal.

[Claim 28] the 2nd connection section with which the 3rd photography unit of further others [unit / according to claim 27 / photography] is connected -- this -- the photography unit characterized by forming the 3rd information transmission-and-reception section which delivers data between the 3rd photography unit connected through the 2nd connection section, and **.

[Claim 29] The stroboscope unit characterized by having the structure which can be detached and attached freely to an electronic camera according to claim 25 or a photography unit according to claim 28, and carrying out luminescence actuation based on the photography start signal of the 1st photography unit.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to photography equipment, especially photography of 3-dimensional scenography or a panorama image is possible for it, and it relates to the photography equipment suitable for a cellular phone.

[0002]

[Description of the Prior Art] Many equipments which prepare two optical system in one camera, and photo a solid image are proposed from the former (JP,6-273172,A, JP,8-317424,A, etc.). Moreover, the approach of switching and photoing a solid image and the usual two-dimensional image according to selection with one camera is also proposed (JP,8-314725,A).

[0003]

[Problem(s) to be Solved by the Invention] However, the equipment by which the conventional proposal is made was what portability is spoiled and it is very hard to treat, when the gestalt of a camera tends to become big and tended to photo only the usual two-dimensional image, since it was the requisite to carry two photography optical system in the body of a camera.

[0004] Moreover, although the adapter which leads both the image for left eyes and the image for right eyes to one optical path is also proposed, by this approach, the effective pixel of an image sensor will be divided into two fields, and there is a fault that sufficient image quality is not acquired. This invention was made in view of such a situation, and when using as a camera in the case of acquiring the usual two-dimensional image, it aims at offering the photography equipment which also enables photography of a solid image or a high definition panorama image if needed, maintaining the conventional camera and the portability more than an EQC.

[0005]

[Means for Solving the Problem] The photography equipment applied to this invention in order to attain said object is characterized by preparing directly the 2nd photography unit which has the 2nd photography optical system removable to the 1st photography unit which has the 1st photography optical system. according to this invention, alone, it is alike, the body of the 1st photography unit which functions as photography equipment is received, and the direct connection of the 2nd photography unit can be carried out if needed. And when performing general photography (a photograph is usually taken), using the 1st photography unit independently and photoing a solid image and a panorama image, the 2nd photography unit is connected to the 1st photography unit if needed, and a multi-view camera is constituted.

[0006] Thus, since the modularization of the photography unit is carried out and it enabled it to change the gestalt of optical system free with an ocellus/multi-view one according to the purpose of use and conditions, also when not spoiling portability in using it as a usual ocellus camera and using it as a multi-view camera, a photography unit can be connected easily, expansion can be planned and there is no futility in the configuration of photography equipment.

[0007]

[Embodiment of the Invention] It explains in full detail about the gestalt of desirable operation of the photography equipment applied to this invention according to an accompanying drawing below. the 2nd photography unit 14 which the photography equipment concerning the gestalt of

operation of this invention is shown in drawing 1 , and can connect this photography equipment 10 with the 1st photography unit (the main camera) 12 which functions as a camera alone, and this 1st photography unit 12 free [attachment and detachment] -- since -- it changes. A taking lens 16, the finder aperture 17, and a stroboscope 18 are formed in the transverse plane of a body, and, as for the 1st photography unit 12, the release carbon button 20 is arranged in the upper part of a body. Behind the taking lens 16, the solid state image pickup device (CCD) which is not illustrated is arranged, the image light by which image formation was carried out to the light-receiving side of CCD through the taking lens 16 is changed into the signal charge of the amount according to the quantity of light by CCD, and reading appearance is carried out as a picture signal based on the driving pulse added from the CCD actuation circuit which is not illustrated. Although the number of pixels of CCD needs to choose a proper thing by relation with the image quality for which it wishes, its thing 350,000 pixels or more is desirable. In addition, the image sensor of the method of not only CCD but an MOS mold, a CID mold, and others is sufficient as an image pick-up means.

[0008] Moreover, the joint holes 24 and 24 (equivalent to the connection section) for connecting the 2nd photography unit 14 with it up and down on both sides of this slot 22 on drawing 1 , while the slot 22 (equivalent to the means of signal transduction and the information transmission-and-reception section) for external storage is formed in the right lateral of the 1st photography unit 12 are formed. In addition, various gestalten, such as a PC card, SmartMedia (image memory card), flash plate memory card, and an IC card, are possible for external storage 26.

[0009] The taking lens 28 of the same specification as the 1st photography unit 12 is formed, and, as for the 2nd photography unit 14, a solid state image pickup device (CCD) is arranged behind a lens like the 1st photography unit 12. On both sides of the connector 30 (equivalent to the means of signal transduction, and the 2nd information transmission-and-reception section) which has the configuration which suited the slot 22 of the 1st photography unit 12 in the left lateral of the 2nd photography unit 14, and this connector 30, fasteners (equivalent to an engagement means) 32 and 32 are formed up and down, and it has structure which can detach and attach the 2nd photography unit 14 to the 1st photography unit 12 through a connector 30 and fasteners 32 and 32.

[0010] When performing the usual photography, the 1st photography unit 12 is used alone, a slot 22 is equipped with external storage 26, and it uses as an ocellus camera. Moreover, when performing stereoradiography and a panoramic exposure, the 2nd photography unit 14 is connected and a multi-view camera is constituted. That is, while making the joint holes 24 and 24 of the 1st photography unit 12 carry out fitting of the fasteners 32 and 32 of the 2nd photography unit 14, by connecting a connector 30 to the slot 22 of the 1st photography unit 12, both are connected, and two photography optical system is horizontally located in a line, and is arranged. And delivery of the signal (data) between both photography units is performed using the slot 22 for external storage.

[0011] Moreover, the slot 34 (equivalent to the 3rd information transmission-and-reception section) and the joint holes 36 and 36 (equivalent to the 2nd connection section) for external storage are formed in the right lateral of this 2nd photography unit 14 like the 1st photography unit 12. Therefore, still more nearly another unit which has the same connection structure as the above-mentioned connector 30 and a fastener 32 can be connected to the 2nd photography unit 14, and two or more units can be connected in sequential escape.

[0012] Drawing 2 is drawing which looked at signs that the 2nd photography unit 14 was connected with the 1st photography unit 12, from the tooth-back side. A liquid crystal display monitor (LCD) 40, the mode dial 42, an electric power switch 43, and finder eye contacting part (inspection hole) 44 grade are prepared in the tooth back of the 1st photography unit 12. A liquid crystal display monitor 40 is a means to display the image photoed through photography optical system, the image information read from external storage 26 (** graphic display in drawing 2), for example, a 2 inch low-temperature polish recon liquid crystal display monitor is used. Although the detailed structure of a liquid crystal display monitor 40 is not illustrated, in the front face of this liquid crystal display monitor 40 The parallax barrier display layer is prepared,

and when it is a stereo display mode While generating the parallax barrier which changes from the pattern with which the light transmission section and the optical electric shielding section were located in a line in the predetermined pitch by turns to said parallax barrier display layer The slit-like (shape of strip of paper) image fragment in which enantiomorph (or two or more images for a display) is shown is arranged to the lower layer image display side by turns, and is displayed on it, and stereoscopic vision is made possible. Moreover, the picture change display which changes the content of a display according to the direction to see using the same principle is also possible, for example, when creating three kinds of picture change display objects, the image pattern which arranged the image fragment A for the 1st display image, the image fragment B for the 2nd display image, and the image fragment C for the 3rd display image to the circuit system at the condition ABCABCABC.... is formed.

[0013] The mode dial 42 is formed in the location in which the upper right corner of the 1st photography unit 12, i.e., the thumb of the right hand which grasped the camera right part (grip section) on drawing 2 , is located automatically. The notation or the alphabetic character which this mode dial 42 is an actuation means change the function (mode) of a camera, for example, shows the modes, such as "a setup (SETUP)", a "self-timer", "manual photography", "auto photography", "playback", "elimination", "image protection (protection)", and "personal computer (PC) connection" etc., for every click halt location along a hoop direction is formed in order.

[0014] Rotation actuation of this mode dial 42 is carried out in the direction of a clockwise rotation, or the counter clockwise direction on drawing 2 , and mode setting is performed by comparing the notation or alphabetic character showing the desired mode with an index 46. The cross-joint key 48 is formed in the tooth back of the 2nd photography unit 14. This cross-joint key 48 is an actuation key which can be freely concentrated in the four directions in which four directions intersect perpendicularly, it has the configuration of a pan form where the center section was dented, and the mark which shows the direction of actuation of the four directions of vertical and horizontal is formed in the slant surface part which goes to a central flat part from a periphery edge.

[0015] By pressing near which mark among the marks which show the four directions of vertical and horizontal, the cross-joint key 48 concentrates and can input now corresponding directions of four directions (a top, the bottom, right, left). This cross-joint key 48 is equivalent to a means amend gap with the image acquired by the photography optical system of the 1st photography unit 12, and the image acquired by the photography optical system of the 2nd photography unit 14, operates this cross-joint key 48, and inputs the direction and the amount of displacement which tune finely the location and the include angle of an image which are acquired by the photography optical system of the 2nd photography unit 14.

[0016] Drawing 3 is the block diagram showing the configuration of the photography equipment concerning the gestalt of this operation. The drawing 3 Nakagami stage shows the 1st photography unit 12, and the lower berth shows the 2nd photography unit 14. The 1st photography unit 12 consists of a taking lens 16, the image pick-up circuit 50, the lens driving gear 52, the auto system detecting element 53 (equivalent to AE detection means, an AWB detection means, and AF detection means), the synchronizing signal generating circuit 54, memory 56, picture reproducer 57, the connection detection means 58, and control CPU(central processing unit) 60 grade, and each circuit is connected through the bus 62.

[0017] The 2nd photography unit 14 is equipped with the display-position adjusting-device 72 grade which adjusts the location of the gain equalization circuit 70 which adjusts the gain of a video signal, and the image obtained from two image pick-up systems while it has a taking lens 28, the image pick-up circuit 64, the lens driving gear 66, and memory 68 like the 1st photography unit 12. The image pick-up circuits 50 and 64 contain CCD, a CDS circuit, a gain equalization circuit, an A/D converter, etc., respectively. In CCD, photo electric translation of the photographic subject image which carried out image formation to the light-receiving side of CCD through taking lenses 16 and 28 is carried out, and reading appearance is carried out one by one as a video signal. the A/D converter after being amplified with the gain control amplifier which the sampling hold of the video signal read from CCD is carried out for every pixel in a CDS

circuit, and is not illustrated -- the dot order of R, G, and B -- it is changed and outputted to the following digital signal.

[0018] The auto system detecting element 53 includes AE counting circuit, an automatic white balance (AWB) gain detector, and (Auto-focusing AF) value detector. It detects each signal level of RGB, and the auto system detecting element 53 computes the gain value (AWB value) of an RGB code so that each signal level may be doubled, while it detects a photometry value (AE value) based on the image pick-up output signal for one frame accepted from the image pick-up circuit 50 (digital signal of R, G, and B). Moreover, this auto system detecting element 53 detects the focal assessment value which shows the sharpness of a photographic subject image based on the picture signal accepted from the image pick-up circuit 50, and detects a focal location (AF value) using that focal assessment value. In this way, calculated AE value, an AWB value, and AF value are notified to control CPU 60, and are used for control of AE, AWB, and AF.

[0019] Control CPU 60 controls the corresponding circuit based on the various input signals inputted from the control unit of the release carbon button 20, or mode dial 42 and others while carrying out multiple unit control of each circuit. That is, control CPU 60 sets up the electronic shutter value of the collimator of an image pick-up system, and CCD according to AE value notified from the auto system detecting element 53, it performs exposure control, controls gain control amplifier according to the AWB value notified from the auto system detecting element 53, and sets up a white balance. Moreover, the lens driving gear 52 is controlled according to AF value detected by the auto system detecting element 53, and the focal location of a taking lens 16 is set up.

[0020] This control CPU 60 is used also [image processing / CPU], and performs (brightness Y) signal generation, (color difference C) signal generation, and picture signal processing of compression/expanding, and others for the picture signal outputted from the image pick-up circuit 50 using the working area of memory 56. Picture reproducer 57 decoding-izes the image data processed based on the picture signal read from the image pick-up circuits 50 and 64, the image data by which reading appearance was carried out from external storage 26, and supplies it to the image display means slack liquid crystal display monitor 40. In this way, while the image which CCD caught is displayed on a monitor's 40 screen, the repeat display of the image data stored in external storage 26 is possible.

[0021] If a preview image (the animation or intermittent drawing for a check which is carrying out monitoring before this image pick-up) is displayed on a liquid crystal display monitor 40 and a photography start signal accepts before acceptance of the release signal (photography start signal) ****(ed) by press actuation of the release carbon button 20 etc., the screen of a liquid crystal display monitor 40 will stand it still (frieze). And after the picture signal by which reading appearance was carried out from the image pick-up circuits 50 and 64 in response to acceptance of a photography start signal passes through predetermined processing, compression processing is carried out if needed and it is recorded on external storage 26. In addition, the internal memory built not only in the external storage 26 which can be detached and attached freely but in each photography units 12 and 14 is sufficient as the gestalt of a record medium. Moreover, a photography start signal may be added from the outside of photography equipment 10 like remote control or an external connection device. If above-mentioned record processing is completed, a frieze of a screen will be canceled and it will return to an animation or an intermittent drawing display.

[0022] Moreover, the image data saved at external storage 26 can be read based on control of control CPU 60, and the image data by which reading appearance was carried out is outputted to a liquid crystal display monitor 40 through picture reproducer 57, after expanding processing is carried out. The 1st photography unit 12 has a connection detection means 58 to detect that the 2nd photography unit 14 was connected, detects that the 2nd photography unit 14 was connected at the contact of the joint section, and notifies the detecting signal to control CPU 60.

[0023] The synchronizing signal generating circuit 54 gives the synchronizing signal of signal processing to the 2nd photography unit 14 while giving the timing signal of the image pick-up circuit 50, the auto system detecting element 53, an image-processing circuit, etc. The 2nd

photography unit 14 controls the image pick-up circuit 64 and the lens driving gear 66 by control CPU 74 based on AE and AWB which were obtained by the auto system detecting element 53 of the 1st photography unit 12, and AF information. Moreover, control CPU 74 controls the gain equalization circuit 70 based on the information accepted from the 1st photography unit 12 to double the video signal of the 2nd photography unit 14 with the video-signal level of the 1st image pick-up block. In addition, it is also possible to omit the control CPU 74 of the 2nd photography unit 14, and to make the control CPU 60 of the 1st photography unit 12 serve a double purpose.

[0024] Moreover, the auto system detecting element 75 may be formed also in the 2nd photography unit 14, and AE, AWB, and AF may be detected based on the picture signal outputted from the image pick-up circuit 64 also in the 2nd photography unit 14. In addition, when this detecting element is prepared, the gestalt which shares the object for detection and uses detection information for condition of detecting AE and AWB by the detecting element (53) of the 1st photography unit 12, and detecting AF by the detecting element (75) of the 2nd photography unit 14, mutually is also possible.

[0025] The photography field according [the display-position adjusting device 72] to the image pick-up system of the 1st photography unit 12, It is the means of ** which amends gap of the photography field by the image pick-up system of the 2nd photography unit 14. The output logging field (location) of CCD of the image pick-up circuit 64 is changed, and the display position (output logging location of CCD) of the 2nd photography unit 14 is adjusted so that the nearest photographic subjects may overlap in the screen acquired from two optical system turned to the same photographic subject.

[0026] When this makes the photography optical system of the 1st photography unit 12, and the photography optical system of the 2nd photography unit 14 coalesce, making both image thoroughly in agreement establishes a means to adjust gap between both images to the 2nd photography unit 14 side, in view of a difficult thing according to the error of the installation location of each CCD etc. Overlapping the image photoed by the image pick-up system of the 1st photography unit 12, and the image photoed by the image pick-up system of the 2nd photography unit 14 on a liquid crystal display monitor 40, and specifically displaying it, the cross-joint key 48 is operated and the image logging location (area) of the image pick-up system of the 2nd photography unit 14 and an include angle are adjusted. The amount of adjustments adjusted with this display-position adjusting device 72 is saved in memory 56 (or internal memory of control CPU 60), and can maintain now the condition of having been adjusted once.

[0027] Although the power sources 77 and 78 according to individual may be formed in the 1st photography unit 12 and the 2nd photography unit 14 about a power source, respectively, the power source 77 prepared in the 1st photography unit 12 is shared as a power source of the 2nd photography unit 14, and if it is made the structure which supplies power from a power source 77 to the 2nd photography unit 14, the power source 78 of the 2nd photography unit 14 is omissible.

[0028] Although the example which connected two photography units (12 14) was shown in drawing 3 , there is no limit in the number of units which can be connected as stated above. With the photography equipment 10 which connects two or more photography units and changes, other photography units of the 2nd henceforth perform image incorporation simultaneously synchronizing with the release signal of the 1st photography unit 12. Moreover, in the case of a continuous shooting mode, the image taking-in timing of each photography unit is shifted predetermined time on the basis of the image taking-in timing of the 1st photography unit, it gives time difference to each unit, and performs continuous shooting.

[0029] Thus, when two or more photography units have two incomes and it performs photography, the circuit of other photography units is driven with the synchronizing signal published from the synchronizing signal generating circuit 54 of the 1st photography unit 12. Or the configuration of establishing the synchronizing signal generating circuit 80 also in the photography unit of the 2nd henceforth, and synchronizing the synchronizing signal generating circuit 80 of each photography unit with the synchronizing signal from the 1st photography unit 12 may be used.

[0030] Moreover, when a zoom lens is used for taking lenses 16 and 28 and the zoom control unit (un-illustrating) prepared in the 1st photography unit 12 is operated, it is desirable to supply the zoom manipulate signal of the 1st photography unit 12 to other photography units, and to carry out actuation control of the zoom device so that the zoom scale factor of each photography unit (12 14) may be in agreement.

[0031] Furthermore, since the amounts of the image data acquired by one photography differ according to the connected number of units when two or more photography units are connected, it is desirable to establish a means to change automatically the display of the shots per hour which can be photoed, based on the connected number of photography units and the memory residue of external storage 26. as a modification of the photography equipment 10 shown in drawing 1, it is desirable like drawing 4 to establish a means (equivalent [whenever / optical axial angle] to an adjustable means) to support the lens section (image pick-up section) 82 of the 2nd photography unit 14 rotatable (the need -- to respond -- the vertical direction) in the level surface, and to set up a rotation include angle automatically according to the field angle of a lens. According to this mode, the image obtained in the 1st and 2nd photography units 12 and 14 can be compounded with the image-processing means inside a camera, or an external image-processing means, and a panorama image can be obtained.

[0032] Moreover, it is desirable to establish a means (equivalent to a lens spacing adjustable means) to make the lens section 82 of the 2nd photography unit 14 into the structure which can be slid horizontally, and to set up lens spacing of the 1st and 2nd photography units 12 and 14 according to the distance to a photographic subject. Although drawing 1 also explained, the 3rd photography unit 84 can be further connected like drawing 5 by having formed the joint holes 36 and 36 also in the side face of the 2nd photography unit 14. Of course, by forming the same joint holes 85 and 85 also as this 3rd photography unit 84, and the slot 86 for external storage, the 4th photography unit which is not illustrated can be connected, there is no limit in a number and two or more photography units can be connected freely.

[0033] Moreover, as shown in drawing 6 besides the mode which connects a photography unit with an image pick-up means, it is also possible to replace with a photography unit and to connect the stroboscope unit 88 which does not include an image pick-up means. This stroboscope unit 88 has a light-emitting part 89, fasteners 90 and 90, and a connector 91, and can carry out direct connection at the 2nd photography unit 14 or the 1st photography unit 12. In addition, the joint holes 92 and 92 and the slot 93 for external storage are formed also in this stroboscope unit 88, and other units can be connected to it in escape.

[0034] According to this configuration, a stroboscope 18 is omitted in the 1st photography unit 12, and the mode of connecting the stroboscope unit 88 or arranging a stroboscope in the photography unit of the 2nd henceforth if needed is also considered. Next, an operation of the constituted photography equipment is explained like the above. The list in the mode in the photography equipment of this example is shown in drawing 7. The function of photography equipment 10 is described referring to this graph. It can dissociate with the 2nd photography unit 14, and the 1st photography unit 12 can be used as an independently usual camera. In this case, the image data which equipped the slot 22 for external storage with external storage 26, used, and was photoed is stored in external storage 26.

[0035] When the 2nd photography unit of photography unit 14 grade plurality is connected with the 1st photography unit 12, it can use for various applications, such as solid mode and panorama mode. That is, solid modes are two photography units, can photo simultaneously the image for left eyes, and the image for right eyes, and can obtain two images with which views differ. Panorama mode leans and sets up the optical axis of the 2nd photography unit 14 outside, and carries out simultaneous photography of the 1st photography unit 12 and the 2nd photography unit 14. And a long panorama image is obtained in a longitudinal direction by connecting the image of two sheets by the image processing.

[0036] Pan-focus mode acquires simultaneously the image of a focus location which is different with two or more photography units, respectively, and obtains the image which compounded each focus field and the focus suited throughout the screen. Dynamic range expansion mode compounds the image of one sheet with a large dynamic range by changing exposure conditions

in two or more photography units, taking a photograph simultaneously, and compounding these data. Special effect mode extracts depth distribution information from the image obtained by carrying out simultaneous photography in two or more photography units, and obtains the image which gives special effect processing of BOKASHI etc. to parts other than a specific distance (for example, part equivalent to a background) based on the value of depth, and emphasizes the main photographic subject.

[0037] Multi-zoom mode changes and carries out simultaneous photography of the focal distance (field angle) of each lens of two or more photography units (lens). If a photograph is taken in this mode, an enlarged display will become possible by high definition about main photographic subjects at the time of playback by photoing the main photographic subject for a high scale factor (looking far), and associating each image data. In addition, the technique of the image processing in each mode in pan-focus mode, dynamic range expansion mode, special effect mode, and multi-zoom mode can be widely applied as an image processing technique which deals with not only the photography equipment 10 of this example but two or more image data. As already explained, a continuous shooting mode drives two or more photography units with a predetermined time interval, and performs continuous shooting.

[0038] When recording the image data acquired in each above-mentioned photography mode, two recording modes, file composition mode and an independent file mode, are prepared. File composition mode is the mode which records a series of related files (image data file) obtained by the ganged operation which has a fixed continuity simultaneous in two or more photography units as one image file.

[0039] An independent file mode is the mode which records as a file the related file obtained in each photography unit according to an individual, and carries out automatic grant of the file name (name) which has relevance in related files. For example, "L" is added to a file name at the data file of the image for left eyes, and "R" is added to the file name of the image for right eyes. In addition, it is desirable to give the name of a sequence which is different so that the file name which carries out automatic grant, and the file name which carries out automatic grant by the independent file mode can distinguish at a glance in file composition mode. Such file management is performed by control CPU 60.

[0040] On the occasion of the repeat display of an image, the four modes, a single mode, a multimode, superposition mode, and parallax barrier mode, can be chosen. A single mode displays one image file data independently on the screen of a liquid crystal display monitor 40. A multimode arranges and displays two or more image files on the screen of a monitor. Superposition mode overlaps and displays two or more images processed in the shape of translucent on the screen of a monitor. The display-position adjusting device 72 can adjust the location of an image, looking at these overlapping images.

[0041] Parallax barrier mode forms the image pattern which arranged the strip-of-paper-like image fragment of the image for left eyes, and the image for right eyes by turns corresponding to the pitch of this parallax barrier, and performs a three dimensional display while it forms a parallax barrier in the parallax barrier display layer of a liquid crystal display monitor 40. About the stroboscope, the two modes, single-engined mode and simultaneous luminescence mode, are prepared. Single-engined mode is the mode in which only a single stroboscope is made to emit light, and simultaneous luminescence mode is the mode in which two or more stroboscopes are made to emit light simultaneously.

[0042] There is the following as a function in which this photography equipment 10 possesses in addition to the mode shown in the graph of drawing 7. It is in the condition that two or more photography units were connected, and it is also possible to add a means to forbid photography unit photography actuation of arbitration or record actuation, and to use only the photography unit of arbitration selectively. In this case, it is desirable to turn off a power source about the unit which is not used and to control useless power consumption.

[0043] The file management means which combines two or more image data photoed with time difference in ocellus mode, and is made into one image file is established. Or two or more image data photoed with time difference in these ocelli mode is made into two or more image files, and a file name is associated. Moreover, in the photography equipment 10 mentioned above, by using

the non-contact means of communications (radiocommunication means) using the electromagnetic wave of infrared radiation, and an electric wave and others as a delivery means of the data of the 1st photography unit 12 and the photography unit of the 2nd henceforth, also after each unit has dissociated, a photograph can be taken simultaneously.

[0044] Although the liquid crystal display monitor is used as an image display means with the gestalt of the above-mentioned implementation, not only liquid crystal but various gestalten, such as EL (electro luminescence) display, an LED (light emitting diode) display, and a plasma display, are possible for the gestalt of an image display means. Although the above-mentioned explanation described to the example the equipment (electronic camera) which changes into an electrical signal the image light which shows a photographic subject using image pick-up means, such as CCD, and acquires an electronic image, this invention can apply also to the photography equipment using the camera (film-based camera) which records image light on the sensitive material of a photographic film and others, and can apply not only to the equipment which photos a static image but to the equipment which photos an animation like a video camera.

[0045]

[Effect of the Invention] Since the modularization of the photography unit which was equipped with photography optical system according to the photography equipment concerning this invention was carried out as explained above, and it was made the structure which connects two or more photography units with the 1st photography unit which may function as photography equipment independently if needed Also when not spoiling portability in using it as a usual ocellus camera, and using it as a multi-view camera, a photography unit can be connected easily, expansion can be planned and there is no futility in the configuration of photography equipment.

[0046] A series of related images are easily acquirable by synchronizing two or more photography units (or linkage), and making it operate especially. Therefore, a solid image and a panorama image can be obtained easily, and depth information can be detected using two or more image data, and special effectiveness, such as obscuring a background, can be given. Furthermore, a high-definition solid image and a high-definition panorama image can be obtained by having established a means to adjust gap of the optical system between the connected photography units.

[Translation done.]

* NOTICES *

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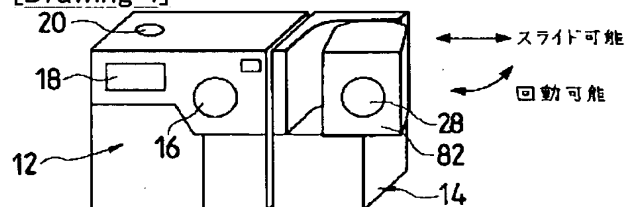
1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.*** shows the word which can not be translated.

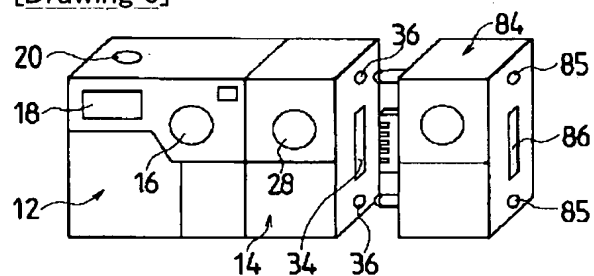
3.In the drawings, any words are not translated.

DRAWINGS

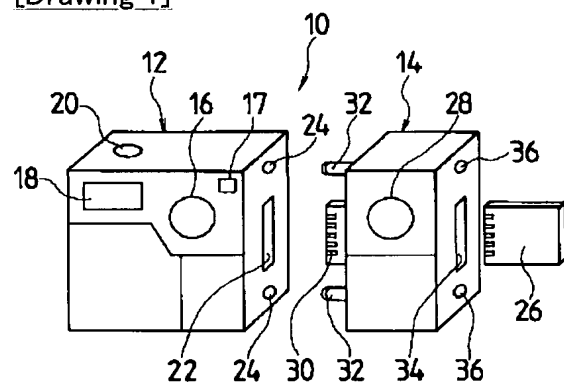
[Drawing 4]



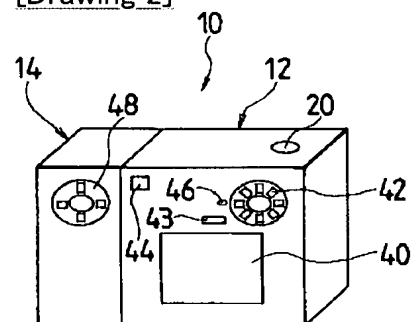
[Drawing 5]



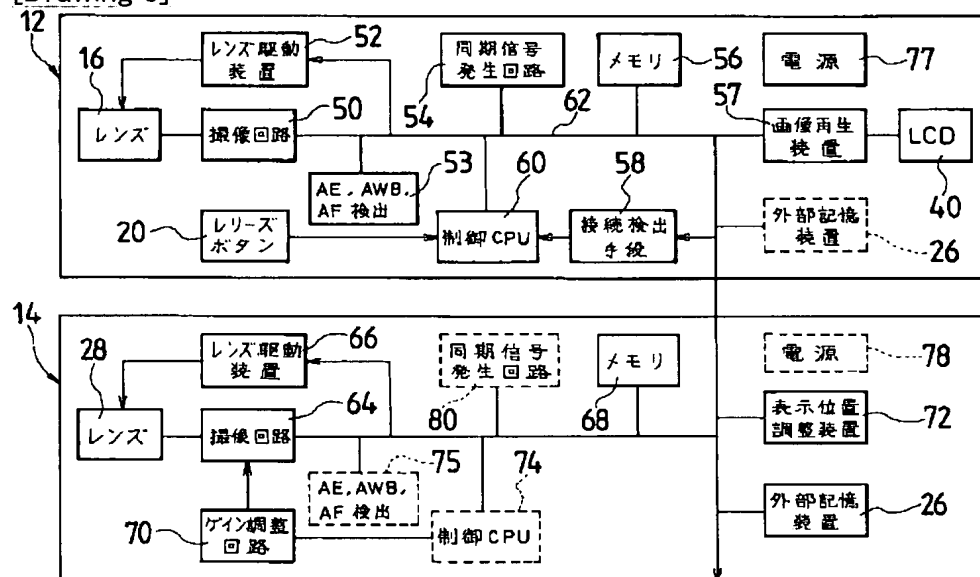
[Drawing 1]



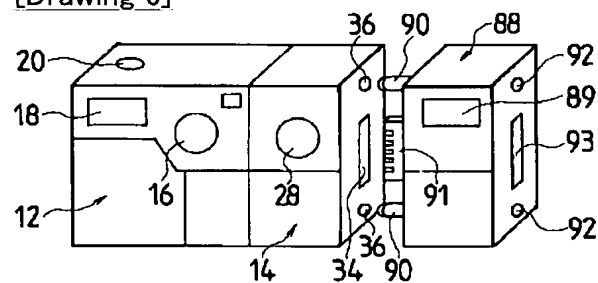
[Drawing 2]



[Drawing 3]



[Drawing 6]



[Drawing 7]

モード一覧表

モード		動作内容
単眼		通常撮影
複眼	立体	複数の撮像ユニットで同時撮影して視点の異なる複数画像を得る。
	パノラマ	第二の撮像ユニットの光軸を傾けて同時撮影し、2枚の画像を繋ぎあわせる。
	パンフォーカス	複数の撮像ユニットでピント位置を変えて同時撮影し、合焦範囲の広い1枚の画像を合成する。
	ダイナミックレンジ拡大	複数の撮像ユニットで露出条件を変えて同時撮影し、ダイナミックレンジの広い1枚の画像を合成する。
	特殊効果 (奥行き情報抽出)	複数の撮像ユニットで同時撮影して得られた画像から奥行き情報を抽出し、奥行きの値に応じてボカシ等の画像処理を行う。
	マルチズーム	複数の撮像ユニット（レンズ）の焦点距離（画角）を変えて同時撮影する。（主要被写体を高解像度で撮影。）
	連写	複数の撮像ユニットを所定の時間間隔で駆動して連写する。
記録	ファイル合成	一連の関連ファイルを1つの画像ファイルとして記録する。
	単独ファイル	関連するファイルを個々に記録し、ファイル名を関連付ける。
表示	単一	1つの画像ファイルデータを表示する。
	マルチ	複数の画像ファイルデータを並べて表示する。
	重ね合わせ	複数の画像を半透明状に重複して表示させる。画像位置の調整をおこなう。
	パララックスバリア	画像表示層の上層にパララックスバリアを形成して、立体表示。
ストロボ	単発	単一のストロボのみ発光させる。
	同時発光	複数のストロボを同時発光させる。

[Translation done.]